GUIDELINES FOR ECONOMIC ANALYSIS

A. Guidelines for New Countries

A. 1. Background

The Millennium Challenge Corporation (MCC) was established in January 2004, pursuant to the Millennium Challenge Act of 2003, to promote sustainable growth and poverty reduction.

The Act states that the MCC is to *"(1) ... provide United States assistance for global development … and (2) to provide such assistance in a manner that* ***promotes economic growth and the elimination of extreme poverty*** *and strengthens good governance, economic freedom and investments in people."*[1]

In light of this legislation, MCC's overriding objectives are to promote economic growth and a significant reduction in poverty in our partner countries. Moreover, we view these goals as closely connected. Experience has shown that the countries that achieved significant poverty reduction in the past fifteen years also achieved significant economic growth. This is because economic growth is about income generation and, especially in poorer countries, the lack of income generation is one major reason behind chronic poverty.[2]

Nevertheless, MCC does not take it for granted that programs that stimulate growth will invariably reduce poverty. MCC looks at the likely distributive effects of proposals and, to the extent that data are available to perform such an analysis, identifies the beneficiaries and estimates the impact on poverty reduction. When the data are not available, MCC requires that baseline surveys be conducted so that such information will become available for monitoring the impact of the programs. Ultimately, MCC seeks significant and measurable increases in incomes of large numbers of poor people and significant reductions in poverty.

MCC analyzes the likely impact on economic growth of its programs by analyzing whether the proposed programs are consistent with international evidence on drivers of economic growth and by use of economic rate of return (ERR) analysis.[3] The essence of such an analysis is a straightforward comparison of costs and benefits, where the costs are the MCA grants and the benefits are increases in incomes in recipient countries. In other words, MCC analyzes proposals as investments, but the payoffs go to countries rather than to MCC. The ERRs are indicators of the economic growth impact because growth is by definition an increase in incomes and the ERRs measure increases in incomes. The ERRs also measure the impact on poverty reduction

[1] Millennium Challenge Act of 2003, Section 602.

[2] Although there are many sources that investigate the relation between economic growth and poverty reduction, and MCC does not favor any particular study, readers interested in evidence from the 1990's may wish to see figure 1 in "Pro-poor Growth in the 1990s: Lessons and Insights from 14 countries" This study is available on the web at http://siteresources.worldbank.org/INTPGI/Resources/342674-1119450037681/Pro-poor_growth_in_the_1990s.pdf.

[3] Although many are familiar with the concept of an economic return, for the sake of clarity consider the following simplified example. If a program proposes an expenditure of $100 Million, and an expected increase in incomes of $150 Million, we say that the program has an economic rate of return (ERR) of 50 percent ((150-100)/100) = 50%.

when the targeted beneficiaries of the projects are poor because the increases in incomes in question are incomes of poor people.

MCC's policy is to have no preference over sectors and the use of economic rate of return analysis does not necessarily favor any particular sector such as infrastructure, agriculture or health. Many of the projects proposed to MCC during the first two years have been in agriculture and infrastructure, and some have concluded that MCC therefore favors projects in these areas. This is not MCC's preference and the economic analysis applied by MCC does not discriminate against important social investments. To the contrary, in some cases, infrastructure and agriculture projects can actually have quite low returns, and health and education projects can have high returns. To underline this last point, Annex 1 describes three examples of health and education projects with high economic returns.

As a general objective, MCC policy is to seek proposals with high economic rates of returns and broad impact, holding income distribution constant. We seek programs with both high poverty reduction impact and high economic returns at the same time, rather than one or the other. Partner countries, through a consultative process, should identify the crucial constraints to growth and direct us to where MCC funds can be most productively used. In accepting proposals, MCC requires that countries analyze the economic impact of several options and select those proposals that have the highest impact on economic growth and poverty reduction for submission to MCC. The analysis of options and selection from these options should be part of the consultative process.

MCC's policy of country ownership means that, through a consultative process, countries have the lead in proposing how funds should be used. MCC respects the ability of the country to analyze its own impediments to growth, and expects that governments will analyze options jointly with a wide array of stakeholders. MCC views its relationship with the countries as a partnership dedicated to the shared goal of determining where MCC funds can have the highest impact in raising incomes and fighting poverty. MCC reserves the right, however, to withhold approval for a proposal or parts of a proposal based on, among other factors, evidence of technical infeasibility, low or negative economic returns and low poverty reduction impact, or the lack of clear measurable benchmarks.

Numerous studies have confirmed the tendency of analysis to be overly optimistic about project benefits before a project begins and for this reason MCC prefers that evidence about a project's impact be drawn from evaluations of similar, completed projects. In keeping with our policy to focus on results, MCC will not approve proposals or parts of proposals without good supporting evidence that the proposal will have a significant impact on economic growth and poverty reduction. Such evidence should be available when a country's proposal is presented to MCC or, in the case of programs that allow for proposals to be considered after Compact signing, prior to funding such proposals.

In addition, MCC will come to agreement with the country on targets and a monitoring plan before the program commences. This monitoring plan should be developed together with the economic analysis to ensure that monitoring focuses on what is essential to producing a high economic impact. Since disbursements of MCC assistance will be conditioned on achieving

benchmarks linked to the economic analysis, overly optimistic economic projections are not recommended. The monitoring plan may also specify mid-stream changes in activities if the benchmarks are not being met. (See Guidelines for Monitoring & Evaluation (M&E) Plans for more detailed information.)

A. 2. Guidance on calculating the economic rates of return and impact on poverty reduction

To estimate the likely impact of proposals on economic growth, MCC's methodology is best described as *micro-economic growth analysis*. This methodology will be described in four steps below. Briefly, it seeks to measure the economic growth impact of proposals at the micro-economic level by measuring the expected increases in either value-added[4] or incomes of individual firms, individuals or sectors of economic activity. Proposals from countries should include a cash-flow analysis that weighs spending on the program against future expected increases in value added or incomes. The internal rate of return should be calculated for these cash flows to summarize the economic impact. MCC refers to this internal rate of return as the economic rate of return (ERR).

When proposals are not amenable to micro-economic growth analysis (as might be the case, for example, in policy reforms that are national in scope), we seek to measure the impact by regression evidence from other countries or cross-country regression analysis or by use of simulations based on conservative assumptions.

Poverty analysis should be conducted by estimating the impact of the program in reducing the poverty gap[5]. In the cases where household surveys are not available to perform detailed poverty analysis, MCC has the ability to fund such surveys so that poverty analysis can become an integral part of MCC monitoring.

The four-step procedure for estimating economic returns is as follows.

- The first step is to define the intended beneficiaries and the set of actions that are necessary and sufficient to achieve the desired impact (such as a rise in incomes or value added of this group). For example, if technical assistance to farmers plus rural roads plus a cold storage unit at the airport are jointly necessary to boost exports and incomes of households, then the economic rate of return analysis should be done for the whole set of activities rather than for each separately. However, the case needs to be made that each component is truly necessary. Padding projects with unnecessary components will reduce the economic return and could result in rejection of the proposal.

- The second step is to gather data on total value-added or incomes, today, of the intended beneficiaries, and to estimate what value-added *without* the program would be over time.

[4] Value-added is the measure of the economic output of an enterprise that is used in national income accounting. It is defined as total revenues minus the cost of intermediate inputs.

[5] A simple definition of the poverty gap is the amount of money, which, when transferred to poor people, brings everyone's income up to the poverty line. Poverty reduction would then be measured as the reduction in this sum of money.

- The third step is to estimate value-added *with* the program over time.

- Finally, the fourth step is to organize a cash-flow analysis in a spreadsheet in which the program costs over time are negative entries and differences in value-added (in other words, value-added with the project minus value-added without the project) are the positive entries. From this cash flow analysis, an internal rate of return can be calculated. This is the Economic Rate of Return (ERR) discussed earlier.

In performing the second and third steps, the following points should be considered.

a) It is a matter of analytical convenience whether to work with value-added or incomes as the micro-economic counterpart to GDP. Recall that GDP can be measured in several equivalent ways. One is to sum value-added over all enterprises in the economy. A second is to sum incomes over all legal entities (wages or labor income of households, profits etc.). Since these are equally valid, the choice is really a matter of convenience. Usually, for agriculture projects it is more convenient to work with household incomes as the unit of analysis. For other projects, value-added of groups of enterprises or value-added of a region of the country is a convenient unit of analysis.

b) The assessment of what will happen *with* the program and *without* the program should estimate *what will most likely occur*, not what *should occur*. For example, when estimating what will happen in the absence of the program the standard assumption should be that business as usual or past practices will prevail.

c) When calculating the costs of using productive resources such as labor, land and capital, it should be assumed that such resources would be used in their best alternative activity. In other words, the concept of opportunity costs should be used in evaluating the costs of using resources.

d) The economic analysis should use shadow prices to the maximum extent feasible. Shadow prices are the market prices that would prevail in the absence of taxes, subsidies or administrative restrictions on market activity. Projects should not be undertaken if the positive economic benefit hinges on the presence of a tax or subsidy.

e) In keeping with the focus on economic growth, and in recognition that data is scarce in MCC countries the priority in the economic analysis should be forecasting increases in incomes or value-added from projects rather than calculating consumer surpluses or other economic rents that demand extensive data. Important sources of rents however should be noted when significant.

f) When evaluating the impact on value-added of a project, the value-added of the whole supply chain should be evaluated (both upstream and downstream suppliers). To the maximum extent possible, such estimates of the "supply chain multiplier" should be based on data gathered by MCC.

g) The analysis should vary the time period over which the ERR is calculated in order to determine the sensitivity of the estimated returns to the time horizon. Normal practice is to examine 10, 20 and 30-year horizons. When the magnitude of the economic returns is sensitive to the time horizon, this should be noted explicitly in reporting the results.

h) Demand multipliers may be included in the economic benefits when (a) the region of the project has significant excess capacity and (b) there is prior empirical evidence that these effects are significant. MCC will seek to gather its own evidence on the magnitude of demand multipliers for use in future estimates of the economic returns. MCC is aware that most guidelines on cost/benefit analysis recommend approaching claims of large multipliers critically.

The following information is also relevant for the economic analysis.

1. MCC policy is to use household survey or other appropriate evidence to determine the impact of its programs by age, gender and income level. MCC will evaluate whether the country has used the best available data to estimate the impact by gender. MCC will also examine whether there are significant issues such as gender bias in selection of program beneficiaries that need to be addressed in program design.

2. When the project relies on individuals or firms making decisions such as investments or changes in behavior, a financial analysis should be performed from their perspective to confirm that they have a financial incentive to perform those actions.

3. MCC policy is to obtain household survey data for assistance in quantifying the impact on beneficiaries as soon as possible. If not available, MCC policy is to require baseline surveys to collect such data in advance of the project.

4. Important environmental and social benefits, costs, and risks of projects should be listed and quantified where possible.

ANNEX 1

This section reviews examples of health and education projects that have double-digit economic rates of return and shows how the cash-flow analysis could be organized for such programs.[6]

The first example is an education program in Mexico that offered cash assistance to poor families in exchange for higher school attendance.[7] Payments were offered to families that kept their children in schools. These payments depended on the age and gender of the child, with higher payments for high school children and higher payments for girls. In a study of this program described in Morley and Coady (2003, page 72) it was estimated that the program spent about 8200 pesos per child to increase annual income by approximately 1,000 pesos. Since the working life of a child is longer than the period over which payments are given, this program could be justified economically.

To see this, we have summarized the economic case for this program in a cash flow analysis in Table 1. As can be seen in the "cost per child" row of the table, the program would spend 787 pesos per child when children were 9 years old, 898 the next year and further amounts in subsequent years. The net cash transfer to the family in the first two years would be 669 pesos and 763 pesos (after deducting 15 percent for administrative costs). Drawing on rigorous evaluations of the impact of this program on educational attainment, studies have shown that this amount of spending is sufficient to raise the education attainment by two-thirds of a year by the time the child enters the labor force. Drawing further on studies on the returns to education in Mexico, Morley and Coady (2003) estimate that this will raise earnings by approximately 1,000 pesos per year over the working lifetime. In Table 1 we have shown the additional income of the child during the first three years of working life, corresponding to ages 16-18. The rest of the table, covering the rest of the working life, is not shown to save space.

The benefits of this program include the 1,000 pesos per year in additional incomes plus the net cash transfers to the families. The costs are of course the annual costs of the program. Table 1 shows that such a program would have an economic rate of return of 20 percent over ten years and 33 percent over the full working life of the child (estimated at 57 years). To conserve space, only the first ten of the 57 years are shown in Table 1. While each of the specific numbers in this table could be refined, the table establishes the basic point that this kind of education program can achieve positive economic returns.

The second example is a health program to address iron deficiency. Recent studies have shown evidence that Iron Deficient Anemia (IDA) is associated with greater susceptibility to disease, and contributes to reduced aerobic capacity and endurance.[8] Health programs in China and

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[6] The presentation of these examples does not suggest necessarily that MCC approves of these projects. Some of the numbers used are estimates for purposes of illustration. While they are believed to be accurate, their accuracy is not guaranteed. Furthermore, some numbers are deliberate simplifications of a more complex reality.

[7] The program is named Progresa and has been extensively studied and documented. For an account that summarizes a lot of the results and research, see Morley, Samuel and David Coady, "From Social Assistance to Social Development: Targeted Education Subsidies in Developing Countries. Center for Global Development, Washington DC, September 2003.

[8] See Thomas, Duncan, "Health, Nutrition, and Economic Prosperity: A Microeconomic Perspective", Commission on Macroeconomics and Health Working Paper No. WGI: 7 May 2001.

Vietnam add iron supplements to sauces that are common in the diet such as soy sauce or fish sauce. Further studies suggest that economic output and incomes can be raised significantly by supplementing diets in this way.

To provide an example of how to calculate the economic returns for such programs, we rely on a recent rigorous study that suggested that incomes could be raised by an average of $40 per person per year by providing supplements that cost an average of $6 per person. It is important to note that usually only a fraction of the persons in a community are iron deficient. Because it is costly to identify them and, furthermore, because it is not possible to guarantee that the deficient will change their diet even when identified, the most cost-effective strategy is often to treat the entire community.

To show a concrete example, consider Table 2, and imagine that there are 20,000 persons in a community and that 30 percent of them are iron deficient. For this 30 percent, income will be raised by $40 with the dietary supplement program, but the rest will be unaffected. Imagine further that it will take seven years for the full productivity and health impact of the program to take effect. The costs of the program would be $6 times 20,000 or $120,000 per year for seven years. As for the benefits (in the form of a rise in incomes), by year 7, 30 percent of the 20,000 will obtain an additional $7 in income for a total benefit of $240,000. For the early years before year 7, it is assumed that 1/7 of these benefits will be realized in the first year, 2/7 in the second year and so forth. It is assumed that iron supplements must be provided every year.

Table 2 shows that net benefits for this program turn positive as early as year 4, and have an economic rate of return of 34 percent over 10 years. The economic rate of return over 50 years is 40 percent. These returns are sensitive to the fraction of the population that is iron deficient. If this fraction were 40 percent rather than 30 percent the rates of return would rise to 59 and 62 percent.

The third example is from a combined health and education project that offered de-worming drug treatment to children in Kenya.[9] Rigorous evaluations indicated that this program increased school attendance by approximately 0.15 years for every year a child was treated. Further research by Knight and Sabot (1990) suggests that schooling accounts for roughly 40 percent of the 17 percent rate of return to education, putting the returns to years of education at approximately 7 percent.

The best way to calculate the economic returns of such a program would be to collect information on earnings of adults in the area under consideration. Short of this however, we can still show some approximate figures. GDP per worker in Kenya is $570. If 60 percent of this is wages and rural wages are 80 percent of the national average, an estimate of the rural adult wage would be $273.6.

The de-worming treatment costs 49 cents per child per year. In Table 3 we have shown an example where such treatment is offered to a child every year in school between age 7 and age 14. Using the 0.15 figure above, these eight years of treatment would mean that the child would

[9] Kremer, Michael and Edward Miguel, "Worms: Education and Health Externalities in Kenya" Poverty Action Lab Working Paper No. 6, September 2001.

gain the equivalent of slightly more than a year of education by age 14 when he or she enters the labor market (0.15 times eight years of treatment equals 1.2 years of education). Using the estimated seven percent figure for the returns to education, this would translate into an additional $22.33 in earnings by the time the child becomes a fully productive working adult (assumed here to happen by age 20). Before age 20 we have assumed that the child would earn only part of this premium.

Altogether this program would have an economic rate of return of 46 percent. This high return is driven by the fact that at 49 cents per child, the cost of the program is low relative to the additional earnings that a child could earn from additional school attendance. Of course, all of these estimates could be investigated further and refined. To achieve such a low cost per child, the program may have to be administered on a large scale. But with a large increase in the supply of educated children the return to education might well be lower than estimated here. This and other considerations would need to be included in any more complete analysis.

As in all these examples, the point is not to recommend specific programs, but rather to illustrate how rate of return calculations could be done for health and education programs and also to establish the point that the rate of return methodology is not biased against health and education projects.

ANNEX 1

Table 1. Cash Transfer for Education Program

Year	1	2	3	4	5	6	7	8	9	10
Age of Child	9	10	11	12	13	14	15	16	17	18
Cost per Child	-787	-898	-1154	-947	-1380	-1446	-1563			
Administrative costs per Child	118	135	173	142	207	217	234			
Cash Transfer to Child's Family	669	763	981	805	1173	1229	1329			
Additional Earnings from Increased Education								1,000	1,000	1,000
Benefits	669	763	981	805	1,173	1,229	1,329	1,000	1,000	1,000
Costs	-787	-898	-1154	-947	-1,380	-1,446	-1,563	0	0	0
Net Cash Flow	-118	-135	-173	-142	-207	-217	-234	1,000	1,000	1,000
Economic Rate of Return (10 years)	20%									
Economic Rate of Return (57 years)	33%									

ANNEX 1

Table 2. Iron Deficiency Program

Population	20,000									
Cost per person of Iron Supplements	$6									
Percent of the population deficient	30%									
Increase in income from reduction in iron deficiency	$40									
Years to reach maximum	7									
	1	2	3	4	5	6	7	8	9	10
Cost	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000			
Increase in incomes	$34,286	$68,571	$102,857	$137,143	$171,429	$205,714	$240,000	$240,000	$240,000	$240,000
Net Cash flow	-$85,714	-$51,429	-$17,143	$17,143	$51,429	$85,714	$120,000	$240,000	$240,000	$240,000
ERR (10 years)	34%									
ERR (53 years)	40%									

ANNEX 1

Table 3 De-worming Program

Output per worker (in USD)	$570.00													
Share of Output per Worker Attributable to Wages	0.6													
Rural Wage discount (compared to average wage)	0.8													
Increase in years of schooling for each year of de-worming	0.15													
Estimated Rate of Return to Education	0.17													
Portion of Return to Education Attributable to Years of Education	0.4													
Annual cost of de-worming per child	$0.49													
Age-wage Profile (in percent of adult wage)										0.5	0.6	0.7	0.8	0.9
Age:		7	8	9	10	11	12	13	14	15	16	17	18	19
School Year:		1	2	3	4	5	6	7	8					
Work Year:										1	2	3	4	5
Estimated adult wage in rural area	$273.60					Wages without Program				$136.80	$164.16	$191.52	$218.88	$246.24
Estimated additional earnings due to additional years of education	$22.33					Wages with Program				$139.99	$170.54	$201.09	$231.64	$262.19
Net cash flow		-$0.49	-$0.49	-$0.49	-$0.49	-$0.49	-$0.49	-$0.49	-$0.49	$3.19	$6.38	$9.57	$12.76	$15.95
Internal Rate of Return	46%													